

CLAIMS

- 1 1. A vacuum pumping system comprising a pump having an inlet for receiving  
2 from a vacuum chamber at least a first gas to be pumped; means for supplying a  
3 second, purge gas to be pumped with the first gas; the pump having an outlet for  
4 exhausting a gas stream comprising the first gas and the purge gas; and gas  
5 separating means for receiving the gas stream and recovering the purge gas from  
6 the stream, the supply means being arranged to receive from the gas separating  
7 means the recovered purge gas.
  
- 1 2. The system as claimed in claim 1, wherein the supply means is arranged to  
2 supply the purge gas directly to the pump.
  
- 1 3. The system as claimed in claim 1, wherein the supply means is arranged to  
2 supply the purge gas to the vacuum chamber.
  
- 1 4. The system as claimed in claim 1, comprising a second pump having an  
2 inlet for receiving the gas stream from the first-mentioned pump and an outlet for  
3 exhausting the gas stream to the gas separating means.
  
- 1 5. The system as claimed in claim 1, comprising a second pump having an  
2 inlet for receiving the recovered purge gas and an outlet for exhausting the  
3 recovered purge gas to the conveying means.
  
- 1 6. The system as claimed in claim 5, comprising means for purifying the gas  
2 exhaust from the second pump.
  
- 1 7. The system as claimed in claim 1, comprising first gas recirculating means  
2 for recirculating first gas from the separating means to the vacuum chamber.

1    8.    The system as claimed in claim 7, wherein the recirculating means  
2    comprises means for purifying the received first gas.

1    9.    The system as claimed in claim 8, wherein the recirculating means  
2    comprises means for pressurising the received first gas.

1    10.   The system as claimed in claim 9, wherein the separating means comprises  
2    cryogenic separating means for separating cryogenically the first gas from the gas  
3    stream to recover both the first and second gases.

1    11.   The system as claimed in claim 10, wherein the cryogenic separating  
2    means is arranged to condense the first gas without condensing the second gas.

1    12.   The system as claimed in claim 1, wherein the first pump comprises a  
2    turbo-molecular pump.

1    13.   The system as claimed in claim 1, wherein the first gas comprises a low  
2    thermal conductivity gas.

1    14.   The system as claimed in claim 13 wherein said low thermal conductivity  
2    gas is selected from the group consisting of xenon and argon.

1    15.   The system as claimed in claim 1, wherein the purge gas is lighter than the  
2    first gas.

1    16.   The system as claimed in claim 15, wherein the purge gas comprises one of  
2    helium and nitrogen.

1    17.   A vacuum pumping system, comprising first gas supply means for supplying  
2    a first gas to a vacuum chamber; a pump arranged to receive at least the first gas  
3    from the chamber; second gas supply means for supplying a second gas for

4 pumping with the first gas; and gas separating means for receiving a gas stream  
5 output from the pump, recovering the first and second gases from the gas stream,  
6 outputting the recovered first gas to the first gas supply means for recirculation  
7 through at least the chamber and outputting the recovered second gas to the  
8 second gas supply means for recirculation through at least the pump.

1 18. An extreme ultra violet lithography apparatus comprising a vacuum  
2 pumping system as claimed in claim 1.

1 19. A method of vacuum pumping, comprising receiving at a pump at least a  
2 first gas from a vacuum chamber, and a second, purge gas for pumping with the  
3 first gas; exhausting from the pump a gas stream comprising the first and second  
4 gases; recovering the second gas from the stream and recirculating the second  
5 gas through at least the pump.

1 20. The method as claimed in claim 19, wherein the second gas is recirculated  
2 through both the vacuum chamber and the pump.

1 21. The method as claimed in claim 19, wherein the pressure of the gas stream  
2 exhausted from the pump is increased prior to the recovery of the second gas  
3 therefrom.

1 22. The method as claimed in claim 19, wherein the pressurised gas stream is  
2 purified prior to the recovery of the second gas stream therefrom.

1 23. The method as claimed in claim 19, wherein the pressure of the recovered  
2 second gas is increased prior to its recirculation.

1 24. The method as claimed in claim 23, wherein the pressurised, recovered  
2 second gas is purified prior to its recirculation.

1    25.    The method as claimed in claim 19, wherein the first gas is recovered from  
2    gas stream and recirculated to the vacuum chamber.

1    26.    The method as claimed in claim 25, wherein the recovered first gas is  
2    purified prior to its return to the vacuum chamber.

1    27.    The method as claimed in claim 26, wherein the recovered first gas is  
2    pressurised prior to its return to the vacuum chamber.

1    28.    The method as claimed in claim 19, wherein the first gas is cryogenically  
2    separated from the gas stream to recover the first and second gases.

1    29.    The method as claimed in claim 28, wherein the first gas is condensed  
2    without condensing the second gas to separate the first and second gases.

1    30.    The method as claimed in claim 19, wherein the first gas comprises a low  
2    thermal conductivity gas.

1    31.    The method as claimed in claim 30 wherein said low thermal conductivity  
2    gas is selected from the group consisting of xenon and argon.

1    32.    The method as claimed in claim 19, wherein the second gas is lighter than  
2    the first gas.

1    33.    The method as claimed in claim 19, wherein the second gas comprises one  
2    of helium and nitrogen.